REMARKS

Reconsideration is respectfully requested in view of the foregoing amendments and the remarks which follow.

By this amendment, claim 1 has been amended to recite the molar ratio of the ammonia or ammonium salt in the reactant mixture relative to the nitric acid formed from the metal nitrate by the metal oxide synthesis. In view of the amendment of claim 1 in the manner indicated, claim 11 would be redundant and, accordingly, has been cancelled. The presently pending claims are 1-10, 12 and 13.

Claims 1-13 stand rejected under 35 U.S.C. §103(a) over U.S. 5,480,630. This rejection is respectfully traversed.

While US 5,480,630 discloses the production of fine metal oxide particles, it does not disclose the claimed techniques for preparing the fine metal oxide particles and for treating the harmful nitrogen-containing compounds produced concurrently with the synthesis of the fine metal oxide particles in the same reactor.

More specifically, the reactant, which is recited in claim 1 of the present invention, essentially comprises i) water, ii) at least one water soluble **metal nitrate, and iii) ammonia or an ammonium salt**, but according to the disclosure of the '630 reference, the reactant for the aluminum salt is an alkali **or** acidic aqueous solution. Therefore, the '630 reference does not disclose the use of nitrate **and** an ammonia compound as reactants.

Meanwhile, as disclosed in the detailed description, and as is exemplary of the present invention, the ammonia or ammonium salt serves to convert the toxic nitrogen-containing compounds, which are generated concurrently with the synthesis of the metal oxide particles, into harmless compounds. It should be noted that the ammonia or ammonium salt is used in a molar ratio of 0.5-3.0 relative to the nitric acid which is

converted stoichiometrically from the used metal nitrate by the metal oxide synthesis reaction.

When the molar ratio is less than 0.5, an insufficient quantity of the harmful nitrogen-containing compound is converted to the ammonia or ammonium salt. By contrast, when the ratio exceeds 3.0, the quantity of ammonia or ammonium salt contained in the effluent solution becomes too great.

Since amended claim 1 now recites the molar ratio of ammonia or ammonium salt to nitric acid, the claimed invention is distinguishable to an even greater extent over the teaching of the '630 patent since the disclosure of that patent never even considers or suggests the significance of that ratio. Thus, the §103(a) rejection has been overcome and should be withdrawn.

Claims 1-13 also stand rejected under §103(a) over the article by Dell 'Orco in combination with the '630 reference. This rejection is traversed.

As disclosed in the present invention (please see the Background Art), applicants knew of the Dell 'Orco document . However, the Dell 'Orco reference relates to a method for the removal of ammonia which occurs in decomposition of hazardous organics or the removal of a nitrate which occurs in the hydrothermal treatment of explosives or propellants.

When metal compounds exist in an organic material which is to be decomposed, the metal compounds form non-soluble salts, such as NaCl, Na_2CO_3, $CaCl_2$, etc. and such generated salts adhere to the piping and block the flow when dealing with supercritical water. Therefore, non-plugging techniques, such as non-forming salt techniques, are the main considerations addressed in the art of the Dell 'Orco reference. That is, the reference

does not disclose or suggest <u>a method of preparing fine metal oxide particles of solid phase</u> and decomposing harmful nitrate by-products generated concurrently therewith.

As disclosed in the experimental examples of Dell 'Orco, since the initial materials are all water-soluble metal oxides, these cannot be recovered in the solid phase metal oxide. That is, metal oxides in the solid phase, such as Na_2O and Li_2O, are difficult to obtain from the initial materials, such as $NaNO_3$ and $LiNO_3$, which are water-soluble materials.

Therefore, the reference does not even include the concept of synthesizing solid phase metal oxides. Furthermore, the reference relates to a method of removing ammonia which is a by-product in the decomposition of hazardous organics or a nitrate by-product in hydrothermal treatment of either explosives or propellants with supercritical water oxidation (SCWO).

Moreover, the claimed invention is different from and distinguishes over the reference in view of its mechanism of decomposition. As disclosed at page 2549, lower left side of the document, the conditions disclosed in the reference are 450-530°C, nearly 300bar and 150-80 kg/m^3 of water densities.

Under these conditions, the decomposition rate increases depending on the increase of the temperature, but at about 450°C, the decomposition rate is very low, namely, less than 20%. (See figs. 4, 5 and 7.) However, in the claimed invention, (examples 1-19), cerium nitrate and ammonia water react at 385-425°, 300 bar and 189-504kg/m^3 of water densities. Under these conditions, it should be noted that the higher temperature results in a much higher decomposition rate of nitrate. In fact, the decomposition rate is as much as 66.7 to 96.3%.

The high decomposition rate achieved by the claimed invention at the comparatively low temperature employed is thought to be a result of the synthesized crystalline cerium oxide nano-particles which serve as a decomposition catalyst. Since the size of the synthesized metal oxide is as small as 40nm, the specific surface area is large enough to play a role as an effective catalyst.

Therefore, in view of waste decomposition technique with SCWO, as well as the synthesis of fine metal particles, it should be understood that using concurrently synthesized nano-sized metal oxidation as a catalyst in the present invention is a very advanced technique and clearly distinguishable from the teachings of the Dell 'Orco article in combination with the '630 reference.

Since applicants have overcome the §103(a) rejection based on the combination of Dell 'Orco in view of Arai et al ('630), its withdrawal is solicited.

The issuance of a Notice of Allowance is respectfully solicited.

Please charge any other fees which may be due, and which have not been submitted herewith, to our Deposit Account No. 01-0035.

Respectfully Submitted,

Jay S. Cinamon

JAY S. CINAMON
Attorney for Applicants
Reg. No.24,156

ABELMAN, FRAYNE & SCHWAB
666 Third Avenue
New York, New York 10017
(212) 949-9022
(212) 949-9190

Lee&park/2 2 07 wan-jae myeong et al., amt